COST AND EFFECTIVENESS OF TRAINING ORAL READING SKILLS IN PRESCHOOL CHILDREN AT THREE LEVELS OF MASTERY

An abstract of a Thesis by
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The problem. Little empirical research has been done to enable behavioral engineers to set mastery criteria at other than arbitrary levels. This study attempted to determine the cost and effectiveness of low (60%), moderate (100%) and high (overtraining) criterion levels, by comparing the number of trials required to train and retrain words with the retention generated at the different levels of mastery.

Procedure. Seven preschool children were trained to identify fourteen English words. Words were presented with a modified slide viewer apparatus; initially, both the word and its corresponding picture background were presented. Gradually, the background was faded so that responding was under the control of the word itself. Following training to three criterion levels, retention was measured at three and nine week follow-ups. Words were then retrained to their original level of mastery.

Findings. A moderate (100%) level of mastery proved to be optimal. The cost of overtraining was prohibitive due to the large number of training trials required. Retention was inferior for words trained to the low criterion (60%), but equal for the moderate and high criterion word groups after a nine week period.

Recommendations. More research is needed to determine whether more extensive overtraining would prove superior in terms of retention, despite its higher cost. Questions of cost and effectiveness of different mastery criteria might be investigated with other populations, different skill areas, and might use techniques other than fading.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Fading, or the gradual elimination of a redundant stimulus while bringing a response under stimulus control, was developed by Terrace (1963) in studying color discrimination in pigeons. This work was expanded by Moore and Goldiamond (1964), who taught children to discriminate degree of rotation in triangles. Others contributing to the literature on fading include Schusterman (1966), who compared serial discrimination-reversal learning with and without errors in the California sea lion, and Sidman and Stoddard (1967), who studied errors made in childrens' discrimination of circles from ellipses. Goldin and Savoy (1968), and Touchette (1968) studied discrimination learning in children and severely retarded boys, respectively.

The desirability of "errorlessness" has been discussed by Holland (1960) and Terrace (1963). The use of fading reduces errors made during training, thus resulting in less "emotional" behavior on the part of subjects (Terrace, 1963). The gradual withdrawal of stimulus support (fading) is one form of shaping, which is the fastest way to develop a complex repertoire (Holland, 1960).

Many skills have been made easier to teach through the implementation of fading techniques. Among these are discrimination of alphabet letters (Karraker & Doke, 1970),

self-care skills (Phillips, Phillips, Fixsen & Wolf, 1971), and instruction following (Whitman, Zakaras & Chardos, 1971). Fading has been shown to be more effective than superimposition of stimuli in teaching oral reading (Corey & Shamow, 1972), and superior to immediate presentation in the acquisition of a conditional discrimination (Dougherty, 1972).

Mastery criteria have been an important aspect of behavioral programs, as well as more traditional teaching approaches (Peter, 1965). According to Bloom (1970, p. 43), "mastery" specifies "... the minimum level of acceptability that a student must attain in a course of study." There is general agreement that a skill must be "mastered", but there is less agreement on what constitutes "mastery." The extent to which training proceeds depends upon this arbitrarily defined mastery criteria.

Several approaches to mastery training seem to advocate moderate to high criterion levels (Wheeler & Fox, 1972; Semb, 1974). The Monterey Language Program, one approach to Peter's (1965) prescriptive teaching, requires 80% correct responding (Gray & Ryan, 1971). Tawney (1972) arbitrarily set the criterion at 90% for training of letter discrimination in preschool children.

There has been little systematic effort to examine the relative merits of different criterion levels. A recent exception (Semb, 1974) considered low (60%) vs. high (100%) criteria, and concluded that high levels produced better test

performances in a college-level, developmental psychology course. In a precision approach to reading instruction, Gray, Baker and Stancyk (1969) set a moving criterion of 92%, ± 2% to ensure that an "optimal" number of errors was maintained. Pilot studies showed that programs causing no errors were too "easy", resulting in a loss of interest, but that a high rate of correct answers was still desirable. Another procedure to ensure a high rate of correct responding is overtraining.

Overtraining defined by Smith (1968, p. 58), is "... the presentation of a task beyond the point of initial mastery." Improvement in learning, retention, transfer and relearning were facilitated when overtraining had taken place (Gilbert, 1967; Postman, 1962; Mandler & Heinemann, 1956). In the present study, overtraining was operationally defined as the provision of an additional session of six training trials, one for each fading step, after a subject had attained 100% mastery on a given word.

Retention and transfer of learning are important considerations of any teaching procedure, but another consideration, not often analyzed, is the actual financial cost for implementing a specific procedure. A cost-effectiveness analysis might lend itself to empirical determination of optimal mastery criteria. Such analyses have been extended from the governmental to the mental health fields (Alexander & Messal, 1972), and into education (Carpenter & Haggart,

1970). In a recent study (Ludwig, 1973), the cost per behavior change was determined for physical therapy behavior modification projects. An alternative approach would consider the cost per behavior program, given comparable effectiveness of different programs. This approach allows for the initial high start-up costs of programs as suggested by Ludwig (1973). Such an analysis, when applied to a study on word acquisition such as conducted by Corey and Shamow (1972), or Lahey and Drabman (1974), would have contrasted the number of trials to criterion against the retention generated at different levels of mastery. The former is a cost variable, while the latter is an outcome measure of effectiveness.

The present study attempted to determine empirically the cost-effectiveness of different amounts of training, as presented by 60%, 100% and overtraining criterion levels in the acquisition of oral reading skills by preschoolers. The study employed fading techniques, utilizing the apparatus developed by Corey and Dorry (1974). It employed the six words taught by Corey and Shamow (1972), and trained nine additional words. Foreign language "dummy probes" were used during testing phases, similar to the foreign language words taught by Corey and Dorry (1974), using the modified slide viewer apparatus. The study employed concurrent training of all 15 words, which has been shown superior to serial training in terms of generalization, despite requiring the same number of training trials (Schroeder & Baer, 1972). Token

reinforcement was incorporated into the training procedures, as it has been shown to be superior to verbal reinforcement in the acquisition of oral reading (Lahey & Drabman, 1974).

Cost-effectiveness was considered in terms of four variables: a) number of trials required to reach criterion at the three levels of mastery; b) retention over intervals of three and nine weeks; c) number of trials required for retraining to the previous criterion; and d) estimated cost of reinforcers.

CHAPTER II

METHOD

Subjects

Twelve children from a Des Moines area preschool were tested for their ability to identify one or more words from a stack of fifteen flash cards. Five children were eliminated after correctly identifying one or more of the words. The seven remaining children served as subjects. They were both male and female, ranging in age from 3 years-8 months to 5 years-5 months at the time of pretesting.

Stimulus Materials

Slides were constructed from thirty Milton Bradley "Picture Flash Words for Beginners" (see Appendix A). Varying numbers of three, four, five and seven or more letter words were selected from the sample purchased. Care was taken to provide a balance of word length and difficulty within the words available. Stimulus words were roughly equated for difficulty by the manufacturer, and intended for use with the beginning reader. Corresponding black-and-white line drawings were photographed, and mounted in glass slide holders. Eighteen-point lower case press-on letters, forming the selected words, were superimposed on the pictures. A layer of tissue paper was added to provide opacity when only the word was to be seen. Fifteen English words were selected

for training. Five each of English, German and French words were used as "dummy probes" during testing for mastery. Foreign language words were either one or two syllables in length (see Appendix B).

Apparatus

A modified slide viewer (Sears #99261) was used for slide presentation. A 2.6 v. ac transformer (GAF Pat. 33-71302) allowed access to house current in the experimental area. A 6-position rotary switch was wired in series with the transformer, allowing for variation of resistance. Six steps, for varying from full intensity at Step 1 (0 ohms), to near-darkness at Step 6 (6.2 ohms), were used in fading the picture background. Light intensity was gradually decreased so that at Step 6 the picture background was barely visible, while the word was clearly illuminated by light entering the front of the viewer. The rotary switch was mounted as a remote control operated by the research assistant.

Recording

The research assistant observed the subjects, and recorded subjects' responses simultaneously with the experimenter, thus providing a continuous reliability check. Two independent reliability checks were provided by trained observers.

The experimental area was approximately 8' X 10', with

chairs for experimenter, subjects, and research assistant, and a small, rectangular table upon which the slide viewer and control box were placed. The experimenter operated the slide viewer in addition to recording and token delivery.

Pretraining

Subjects were taken individually to the experimental area by the research assistant, and were given a token by the experimenter, with the instructions: "You can get more of these tokens by learning some words. Then you can trade them in for candy or toys." The experimenter then allowed the subject to trade the token for a choice of either candy or toys, offered by the research assistant, from three cylindircal containers filled with reinforcers of different token values.

The subject then was seated before the slide viewer, and given the following instructions: "Watch this screen and tell me what you see. Sometimes you will get a token for telling me what you see." The subject was then shown six slides with picture backgrounds only, and reinforced with tokens for attending after the first, third and sixth trials. Each subject received one pretraining session, with one trial each on the six training slides, chosen from English words not to be experimentally trained for that subject. Following the session, subjects exchanged their tokens for candy or toys.

Pretesting

The day following pretraining, each subject underwent five sessions of pretesting. Subjects received one trial per session for each of the fifteen picture backgrounds, and each of the fifteen stimulus words. Thus each session consisted of 30 trials. Backgrounds and words were alternated serially so that either words or backgrounds were visible. Since the picture backgrounds were all familiar to the subjects, they were prevented from responding incorrectly on consecutive trials consisting of a word and a picture.

Slides were presented with these instructions from the experimenter: "Tell me what you see." Subjects were instructed to say "Pass" rather than "I don't know" when unable to respond to a word or picture. Responses were scored as either correct or incorrect.

Subjects at the beginning of the pretesting were SR^{+} with a fixed ratio of one token for every three consecutive trials on which attending was judged adequate by the experimenter. Attending was defined as: head and eyes of subject oriented toward the stimulus presentation. By the end of the pretesting the ratio had been increased to one token for every five trials on which attending was judged adequate by the experimenter.

Training

Each subject was trained on 14 words, selected from

the list of words that the subject was unable to identify during pretesting. Criterion levels for training were 60%, 100% and overtraining. The 60% criterion level was reached when 3 of 5 words were responded to correctly on the testing trials at the end of each session. The 100% criterion level was reached when 5 of 5 testing trials were correctly completed. And overtraining consisted of six additional training trials, one for each fading step, after 100% mastery had been reached.

Group I: 60% Criterion. The three subjects were trained to a 60% mastery for 4 words. Five of the remaining 10 words were trained to 100%, the other five words were trained to the overtraining criterion.

Group II: 100% Criterion. The remaining four subjects received training to the 100% criterion on seven of the words, the remaining seven words were trained to the overtraining criterion (see Table 1). As a general rule, words requiring more than 12 trials to reach the 100% criterion were selected to be overtrained (see Table 2).

Two or three words per session were presented to each subject, thus all fourteen words were covered in an approximately five-session cycle. Each session consisted of twelve or eighteen training trials, depending upon whether two or three words were trained in each session. All words being trained during that session were presented before moving to the next fading step.

Table 1

Words Trained to Three Criterion Levels

Subjects	Criteria 60%	100%	Overtraining
S_1	elephant	drum	ball
	gate	airplane	ship
	arrow	apple	balloon
	bird	book	flag
		kite	horse
S_2	apple	flag	dog
	arrow	drum	elephant
	balloon	bird	kite
	ship	airplane	horse
		ball	book
S_3	dog	book, ship	flag, drum
	gate	horse, bird	apple
	ball	airplane	elephant
		kite	balloon
S_4	--	book, flag	dog, gate
	--	drum, kite	arrow, ship
	--	horse, ball	balloon, apple
	--	airplane	elephant
S_5	--	apple, flag	dog, bird
	--	book, drum	arrow, kite
	--	horse, ball	balloon, ship
	--	airplane	elephant
S_6	--	apple, gate	flag, book
	--	arrow, drum	ship, bird, ball
	--	horse	airplane, balloon
	--	kite	elephant
S_7	--	arrow, drum	dog, apple
	--	horse, bird	gate, flag
	--	kite, ball	balloon, ship
	--	airplane	elephant

Table 2

Trials Required for 60% and 100% Mastery

Subjects	S_1		S_2		S_3		S_4		S_5		S_6		S_7	
% Criterion	60	100	60	100	60	100	60	100	60	100	60	100	60	100
Words														
dog	-	-	18*		6		12*		12*		-	-		6*
apple		6	6			18*		18*		6		6		6*
elephant	6			12*		18*		12*		12*		6*		6*
gate	6		-	-	12			12*	-	-		6		6*
arrow	6		6			-	-	12*		24*		6		18
balloon		18*	6			18*		12*		12*		6*		6*
flag		12*		12		18*		6		12		6*		6*
book		12		18*		12		6		12		6*	-	-
ship		18*	6			12		12*		24*		6*		6*
drum		6		12		18*		6		6		6		6
horse		18*		18*		6		6		6		12		6
bird	6			12		12		-	-	12*		6*		6
kite		6		12*		12		6		12*		6		6
airplane		6		6		12		6		6		6*		6
ball		12*		12	6			6		6		6*		6

*Subsequently Overtrained
- Not Trained

The experimenter gave the subjects the following instructions: "Tell me what word you see. Sometimes you will get a token when you get the word right." Responses on training trials were reinforced for correctness on a fixed ratio of one token for every fourth or sixth consecutive correct trial, depending upon whether two or three words per session were trained. Token reinforcement was not provided for attending during training. Responses were recorded as either correct or incorrect. For each correct response on a training trial, the experimenter said: "That's right," or an equivalent response. Corrective feedback for incorrect responses was not used due to nearly errorless performance by the subjects on the fading steps.

Evaluation

The words trained were evaluated daily following the training sessions, in random order for fifteen trials. Words were presented as during pretesting. Sessions were run as quickly as possible to maintain subject performance, but were interrupted after every third trial to reload the slide viewer. Only the stimulus word was visible during testing and immediate feedback on correctness was provided to the subjects following each response.

A third "dummy probe" (see Appendix A) was added to the words tested when only two words were used during the training session. This allowed fifteen testing trials when

only two words were trained. The instructions for testing trials were: "Tell me what word you see. This time, you will get tokens for trying really hard. Be sure you don't know a word before you say 'Pass'."

Token reinforcement for attending on each trial was provided on every fifth testing trial on which attending was judged adequate by the experimenter. A limited hold of ten seconds for responding to each word was used on each trial. After ten seconds had elapsed without a response by a subject, the next slide was presented. Based on percent correct during the daily evaluation, subsequent training was discontinued as each word reached the predetermined mastery criterion. Words not reaching the mastery criterion continued in the training phase until criterion was reached during the daily evaluation.

Follow-Ups

Follow-up intervals of three and nine weeks from the point of criterion mastery were used to test retention. Follow-up testing proceeded similarly to pretesting. Attending was reinforced for every thirty responses on which the experimenter judged attending to be adequate. In the late stages of the study, reinforcement density seemed adequate at higher ratios. Correctness feedback was provided by pulling out the changer, thus illuminating the picture background, after each response.

Retraining

Words falling below their training criterion level on the nine week follow-up were retrained. Words originally trained to 60% mastery, and falling below that level on the posttest were retrained, as were words originally trained to 100% mastery, which fell below 100% on the posttest. Words which were originally overtrained were retrained if they fell below 100% on the posttest. The retraining procedure was similar to the training procedure.

CHAPTER III

RESULTS

Subjects

Trials required to reach mastery at either 60% or 100% levels are presented for all subjects in Table 1. Three subjects (S_1, S_2 and S_3) reached the low mastery criterion (60%) on three to four words. The other four subjects (S_4, S_5, S_6 and S_7) reached the moderate criterion (100%) in one or two sessions, on several words, and therefore it was not possible to utilize three levels of mastery for these subjects. The latter groups acquired an equal number of words (7) at both the 100% and overtraining levels of mastery. Four subjects (S_3, S_4, S_6 and S_7) completed the entire study.

S_5 was removed from the preschool prior to the second follow-up, thus follow-up data are available for only six subjects. S_1 and S_2 were removed from the preschool prior to retraining, thus no retraining results could be obtained for these subjects. Retraining was carried out on as few as four words (S_6), and as many as fourteen words (S_7), for the four subjects remaining at the time of retraining. Words were chosen for retraining on the basis of results of the nine week follow-up (see Appendix C).

Reliability

Continuous reliability checks, for attending and correctness, respectively, were provided on the pretesting and training phases of the study. Independent checks were made by a graduate student and a high school senior. Reliability checks were not possible during the follow-up testing, nor during retraining due to the absence of a research assistant. Mean reliability during pretesting was 98.96%, with a range from 94 to 100%. Mean reliability during training was 99.64%, with a range from 60 to 100%. Reliability was computed using the following formula: R = total agreements/total observations X 100.

Effectiveness

Group data on retention for Follow-ups I and II is presented in Figure 1. At Follow-up I, three weeks after training was completed, mean retention (82%) was greatest for the 100% criterion group of words. Mean retention (45%) was poorest for the 60% criterion group of words, and moderate for the high criterion group of words (66%). At Follow-up II, nine weeks after training was complete, mean retention was equal for the high criterion (67%) and moderate criterion (67%) word groups. Mean retention for the low criterion word group had declined to 29%.

Group data was representative of individual data (see Appendix D) except for S_2 on Follow-up I. Some subjects (S_1,

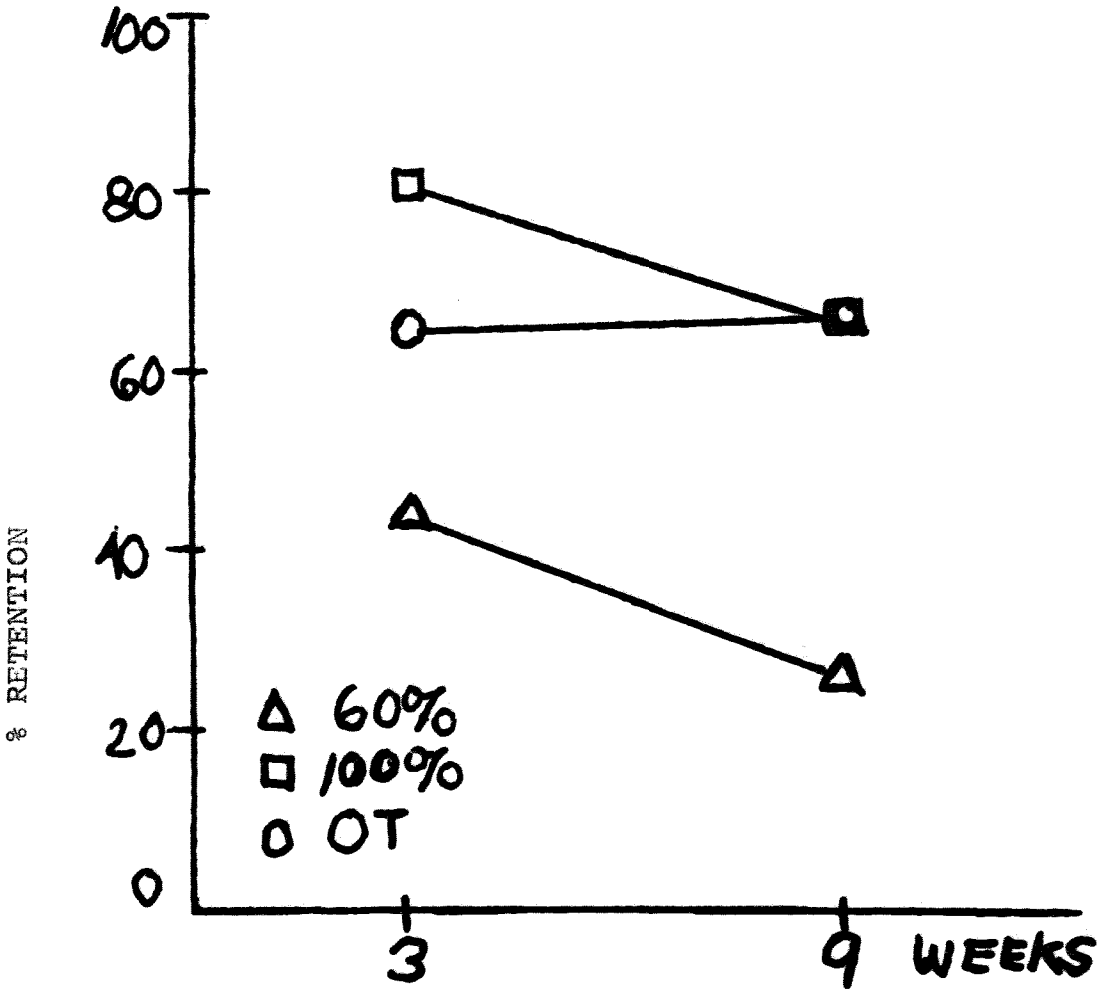

Figure 1. Mean Group Retention at Three and Nine Week Follow-ups at Three Criterion Levels.

S_4 and S_6) maintained superior retention for the moderate criterion word group on Follow-up II, while others reversed the trend (S_2 and S_3). One subject (S_7) had equal retention for the moderate and high criterion word groups.

Cost

Trials required to reach the three criterion levels, for both the training and retraining phases, are presented in Figures 2 and 3. Group data are presented because they closely represent the individual data. Eleven words were trained to the low criterion (60%). The average number of trials required to reach criterion was 6.5. The average number of trials required to reach the 100% criterion was 8.52 for the 43 words trained. For the 44 words overtrained, an average of 18 trials were required to reach criterion.

Mean trials required for retraining to the original criterion level trained were the same for the 100% and overtraining criterion word groups at retraining (Figure 3). One session of six training trials was required to retrain each word to 100% correct recall for each of the criterion levels. Data is not presented for the 60% group since two of the three subjects were unavailable for retraining.

Table 3 presents the number of trials required to reach mastery at each of the criterion levels, and the number of trials required for retraining. The cost per trial was the same for each phase of the study, and is not presented in

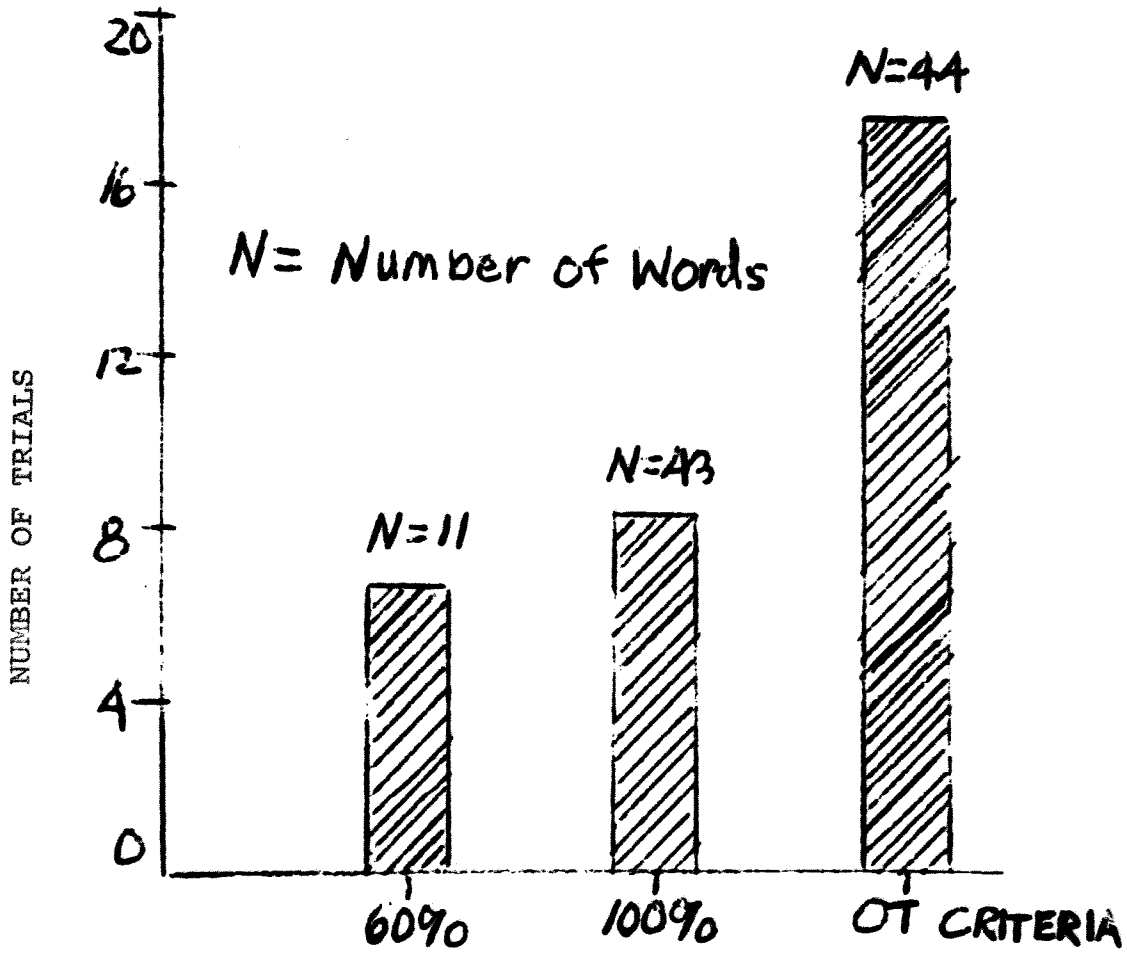

Figure 2. Mean Group Training Trials Required to Reach Mastery at Three Criterion Levels.

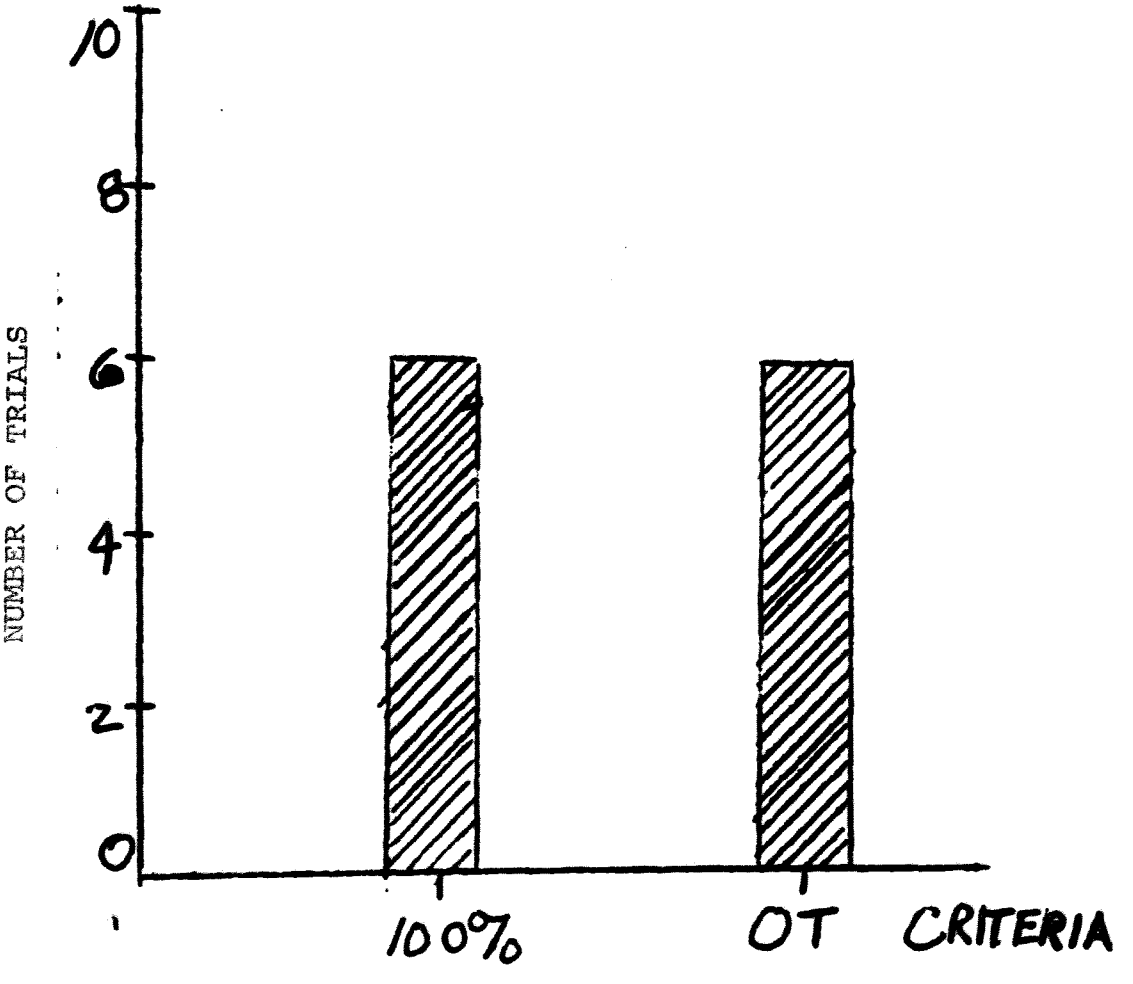

Figure 3. Mean Group Trials Required to Retrain Words at Two Criterion Levels.

Table 3

Number of Trials Required for Training and Retraining for Three Criterion Levels

Individual Groups	Training	Retraining
60%	72	6
100%	348	84
Overtraining	792	96
Total Group	1,212	186

Table 3. Cost per trial was approximately $.01, and was computed for each phase by dividing the reinforcer cost for that phase by the total number of trials in that phase. Total cost of reinforcers was $30.77. Reinforcer cost for each phase was determined by multiplying $30.77 by the percentage of total trials required in each phase of the study.

The differences between the costs of the three criterion word groups is seen in terms of the number of trials required to reach criterion (see Table 3): 72,348 and 792 trials were needed for the 60%, 100% and overtraining groups, respectively. Thus, 4.83 times the number of trials required for 60% mastery were needed to reach 100% mastery, and 11.00 times that number (60% mastery) were required for those words which were overtrained. Trials required for overtraining were 2.11 times the number needed to reach 100% mastery, and the corresponding cost is thus twice as great.

CHAPTER IV

DISCUSSION

The present study attempted to replicate Corey and Shamow's (1972) work with the acquisition of oral reading in preschool children. In addition, the apparatus developed by Corey and Dorry (1974) was used to facilitate word acquisition through a fading procedure. This study sought: a) to train words to different criterion levels of mastery, and b) to measure the effectiveness of the different levels of mastery in terms of retention and ease of retraining.

In earlier research, Postman (1962) studied retention as a function of the degree of overtraining, rather than comparing overtraining with lower criteria, as in this study. He found that amount recalled, retention of difficult lists of words, and speed of relearning, all varied directly with the degree of overtraining. This study found short-term retention superior for words trained to 100% mastery than for words which were overtrained. Longer retention intervals showed no difference in these two levels of mastery. There was also no difference in the number of trials required to retrain words from the two criterion level groups of 100% and overtraining.

In addition to the fading technique, a token system was employed as a motivational tool with the subjects. Since the token system and the fading procedure were held constant

throughout the study, analysis of the contribution of these two variables was not made. In all cases where retraining was necessary, subjects relearned words to their previous criterion in one session.

This study seemed to demonstrate that a moderate criterion level (100%) is superior to overtraining in terms of cost and effectiveness. More trials were required to overtrain words, without corresponding benefits in improved retention or ease of retraining. However overtraining seemed to generate better retention in terms of durability: retention stayed the same from three to nine weeks after training was completed. Retention dropped from the 3 week score for both the 100% and the 60% group when retested after 9 weeks.

Three subjects were lost during the course of the study, resulting in a smaller than optimal sample for group data. However, the nature of the experimental design was such that individual data is meaningful. Subjects received pre- and post-tests, as well as retraining, on words learned. Thus, it was possible to follow individual progress in the acquisition of words, and to pinpoint functioning on daily testing. In comparing individual results, a roughly inverse relationship was found between chronological age and trials required to reach mastery on the training phase of the study (Appendix B). The youngest subject, S_6, required more training trials than any of the subjects to reach mastery. The fact that S_6 required only slightly more trials for

retraining than S_5, the oldest subject, suggests that the study provided important prerequisite behaviors, such as attending skills, for S_6.

Certain limitations restricting the generalizability of these results stem from changes made in the experimental design. Effort was made to facilitate word acquisition while reducing aversiveness of the sessions for the subjects by using immediate feedback on correctness, even during the post-tests. Such feedback might ordinarily be expected to improve results of testing from initial trials of a session to final trials of a session. However, inspection of data from post-tests showed no improvement from initial to final trials of a session. Consistent incorrect responding was shown during pretesting to produce emotional behaviors which disrupted sessions and threatened to terminate subjects' involvement in the study. Redesign of pretesting sessions, so that there was sequencing of picture backgrounds alternated with words, prevented successive trials where an incorrect response might occur. In other words, since all subjects could identify all pictures, but not all words, by alternating picture and words, each subject was ensured of identifying at least every other stimulus (picture) correctly.

The decision to overtrain those words which had proved more difficult (i.e., requiring more trials for acquisition) was made with the goal of ensuring mastery of these words by subjects. However, this effected the retention data for

words which were overtrained vs. those words trained to lower criteria. Had less difficult words been overtrained, retention may have been much higher for the overtrained words. Ideally, words of equal difficulty, determined empirically, might have been trained to different levels of mastery. This may have provided clear differences between different criterion groups of words.

Because of the evolving nature of the experimental design, statistical comparison of criterion groups of words was not possible. Groups of words were not formed independently prior to training, and thus are not amenable to an analysis of variance or other statistical comparison. Subjects, by their performance on the first session of training, were put into either a 60% or 100% mastery group for the 60% group of words as soon as the criterion was reached. They were not trained further. The other words were trained either to 100% or overtrained. Words requiring more than two sessions to reach 100%, but which surpassed 60% on initial training, were overtrained.

The reliability of the results of the follow-up and retraining phases might be questioned due to the absence of reliability checks. However, the study employed a discrete trial training paradigm, which resulted in less difficulty in scoring than might have been the case with continuous recording. Also, the responses were scored either correct or incorrect, thus eliminating a decision as to whether an

approximation to the correct response had occurred. And the excellent reliability during earlier phases of the study lends credence to the recording technique.

In summary, it was found that training to 100% mastery is optimal (compared with overtraining and training to 60% mastery) in terms of the cost of training and retraining, based on number of trials, and the effectiveness of training, based on retention. Future research in the area of word acquisition might provide an empirically defined procedure for overtraining which would determine the minimum amount of trials needed to produce clear differences in retention as compared with training to 100% mastery. Such research might be carried out more easily with motor skills, where the interactive effects of forgetting and the need for retraining would be minimal. Populations of older children might make it easier to obtain clear-cut results from the research suggested.

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APPENDIX A

"Dummy Probes"

English	French	German
broom	chapeau	die Torte
wagon	arbre	die Uhr
bell	lit	der Stuhl
window	pateau	das Bild
shoe	pain	der Zug

APPENDIX B

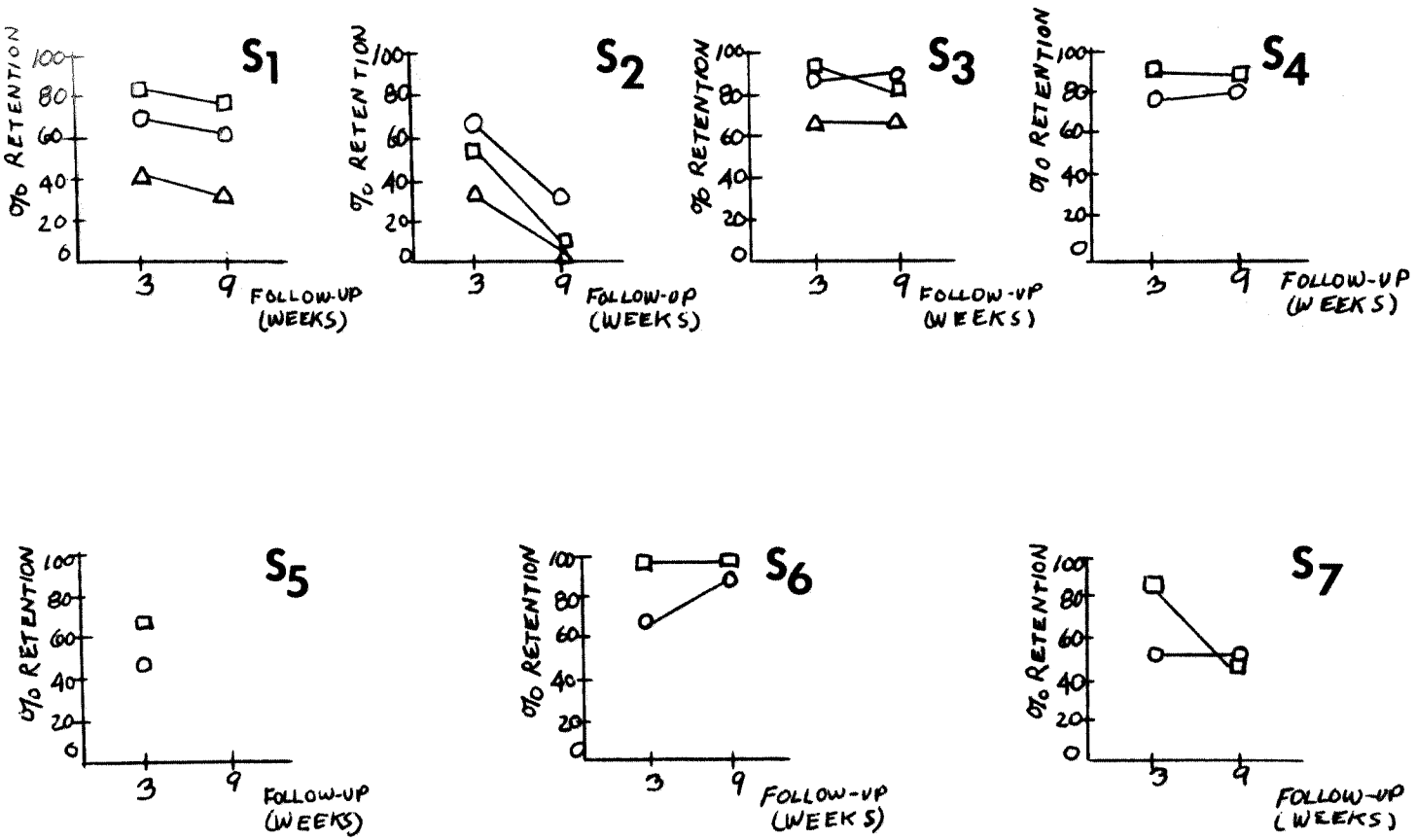
Number of Trials to Criterion at Training and Retraining Vs. Age of Preschool Subjects

Subjects	S_1	S_2	S_3	S_4	S_5	S_6	S_7
Chronological Age	4-0	4-3	3-8	4-5	3-10	5-5	4-4
			Number of Trials				
Training	168	186	210	174	198	138	138
Retraining	-	-	36	42	-	24	84

APPENDIX C

Words Retrained From Three Criterion Groups and Their Retention at Follow-Up II

	Criterion Group		
	60%	100%	Overtraining
Subject			
S_3	dog (40%)	book (80%)	elephant (60%)
		ship (20%)	balloon (80%)
		airplane (80%)	
S_4	-	horse (80%)	dog (60%)
	-	kite (80%)	balloon (80%)
	-	airplane (80%)	ship (20%)
	-	drum (80%)	
S_6	-	-	elephant (80%)
	-	-	balloon (60%)
	-	-	book (80%)
	-	-	airplane (80%)
S_7	-	arrow (60%)	dog (80%)
	-	drum (60%)	apple (40%)
	-	horse (40%)	elephant (0%)
	-	bird (40%)	gate (40%)
	-	kite (40%)	balloon (40%)
	-	airplane (40%)	flag (60%)
	-	ball (40%)	ship (60%)



APPENDIX D. Individual Subject Data on Retention at Follow-up for Words Trained to Three Criterion Levels.

Δ 60%
□ 100%
○ OT